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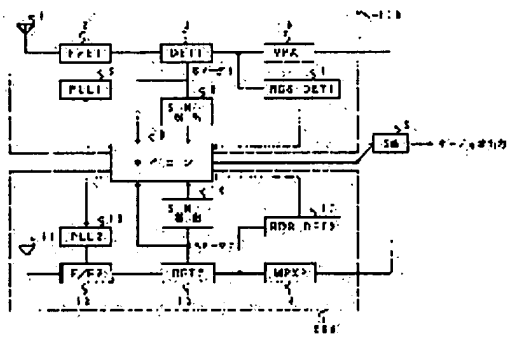
(54) DOUBLE TUNER DIVERSITY RDS RECEIVER

(57)Abstract:

PURPOSE: To provide a double tuner diversity RDS receiver which can decide an accurate receiving state.

CONSTITUTION: A double tuner diversity RDS receiver measures for a fixed time the average value of the S meter signal voltage as well as the noises of both S meters 1 and 2 produced by two tuners 100 and 200 while these tuners are receiving the same frequency. So that the difference of gains is corrected between both antennas 1 and 11. Then the average value of the S meter noises and signal voltage of both meters 1 and 2 are measured in an AF search processing state. The value corrected by the corrected gain difference is defined as a standard of comparison. Thus the frequency receiving states are compared with each other based on the value obtained by correcting the difference of gains between both antennas 1 and 11. Then an accurate receiving state is decided.



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CLAIMS

[Claim(s)]
In the RDS receiver which has two tuners, chooses the good tuner of a receive state, and is received A recovery means to recover RDS data from the input signal which received with said two tuners, A detection means to detect the S meter noise or S meter signal which shows said received field strength, An average means to output the average of the S meter noise detected with said detection means, or an S meter signal while said two tuners receive the same frequency, A memory means for it to be obtained with this average means and to memorize the S meter noise of said two tuners, or the difference of the S meter signal average as correction value, When one tuner looks for the alternative frequency (AF) of the contents of the same broadcast based on a preparation and said RDS data, The 2 tuner diver city RDS receiver characterized by making into a reference value the value which applied said correction value to the S meter noise in the frequency under current reception, the S meter noise in the average and AF frequency of an S meter signal, or the average of an S meter signal.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the 2 tuner diver city RDS receiver which enables decision of an exact receive state especially about a 2 tuner diver city RDS receiver.
[0002]
[Description of the Prior Art] Digital multiplex [of song selection or the program discernment data] is carried out to FM radio broadcasting signal, RDS (Radio Data System) which offers various kinds of services to a driver is put in practical use in the Europe region, and not only the Europe area but global spread will be expected from now on. The electric wave of RDS sent from a broadcasting station is giving the search function which can receive the broadcasting station electric wave of the same program broadcast one after another, when it is received by the mounted tuner, for example, a whereabouts location changes during operation and a receiving station electric wave becomes weak. Discernment TP service etc. is about the PS (receiving station name display) service which displays the broadcasting station name which identifies the program name of a country, or a receiving area and a broadcasting station, and which has PI(program-discernment)-served and has been received on the display of a tuner as typical RDS service, the AF (similar program broadcasting-frequency list) service which display other broadcasting station frequencies which are broadcasting the program of the same contents and which mentioned above, and the station which broadcast traffic information.
[0003] It has two tuners as a receiver which receives this broadcast, and there is a 2 tuner diver city RDS receiver which chooses the good tuner of an electric-wave receive state, and is received. In the conventional RDS receiver with 2 tuner diver city, tuner of one of the two judges whether where reception is continued as it was, since the frequency of a better receive state is looked for when one tuner looks for AF frequency, the S meter (field strength) or S meter noise of two tuners is movable to the frequency.
[0004]
[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional 2 tuner diver city RDS receiver, AF frequency is looked for based on the comparison result on the basis of the S meter noise obtained from two tuners. However, when comparing, the possibility of the incorrect decision by one comparison by fluctuation of a receive state arose, and there was a problem that decision of an exact receive state could not be performed according to the sensibility difference of the antenna connected to two tuners.
[0005] Then, the purpose of this invention is to offer the 2 tuner diver city RDS receiver which enables decision of an exact receive state.
[0006]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the 2 tuner diver city RDS receiver by this invention In the RDS receiver which has two tuners, chooses the good tuner of a receive state, and is received A recovery means to recover RDS data from the input signal which received with said two tuners, A detection means to detect the S meter noise or S meter signal

which shows said received field strength, An average means to output the average of the S meter noise detected with said detection means, or an S meter signal while said two tuners receive the same frequency, A memory means for it to be obtained with this average means and to memorize the S meter noise of said two tuners, or the difference of the S meter signal average as correction value, When one tuner looks for the alternative frequency (AF) of the contents of the same broadcast based on a preparation and said RDS data, It is constituted so that the value which applied said correction value to the S meter noise in the frequency under current reception, the S meter noise in the average and AF frequency of an S meter signal, or the average of an S meter signal may be made into a reference value.
[0007]
[Function] In this invention, it sets to a 2 tuner diver city RDS receiver. While two tuners receive the same frequency Carry out fixed timing measurement of the average of the S meter noise obtained with each tuner, or an S meter signal level, and the gain difference of an antenna is amended. By measuring the average of the S meter noise of each tuner, or an S meter signal level, and making into comparison criteria the value amended with the above-mentioned correction value at the time of AF search processing The receive state of each frequency is compared with the value which amended the gain difference of an antenna, and the judgment of an exact receive state is enabled.
[0008]
[Example] Next, it explains, referring to a drawing about the example of this invention. Drawing 1 is the configuration block Fig. showing one example of the 2 tuner diver city RDS receiver by this invention. This example has the two tuner sections 100 and 200, and each tuner section is equipped with antennas 1 and 11, front ends 2 and 12, the FM detector circuits 3 and 13, the stereo demodulator circuits 4 and 14, the PLL circuits 5 and 15, the S meter noise (S-N) detectors 6 and 16, and the RDS data demodulator circuits 7 and 17, and changes and controls a switch 9 that a microcomputer 8 should choose a better tuner in response to the data obtained from these.
[0009] The signal received with the antenna 1 collaborates with actuation of the PLL circuit 5 in a front end 2, and aligns with the frequency of arbitration. FM detection of the intermediate frequency (I/F) signal outputted from a front end 2 is carried out in the FM detector circuit 3. At this time, the S meter (it responded to field strength) signal according to the level of an I/F signal is acquired, and the S meter noise detector 6 and a microcomputer 8 are supplied.
[0010] The example of a configuration of the S meter noise detector 6 (16) is shown in drawing 2 . In drawing 2 , after DC component is extracted by the low pass filter (LPF) 61, noise components, such as a multi-pass and contiguity active jamming, are extracted by the band pass filter (BPF) 62 and the inputted S meter signal is amplified by predetermined level with an amplifier 63, it is detected with a wave detector 64. In the differential amplifier 65, the difference component of the DC component and noise components, such as a multi-pass, which were obtained in this way is obtained, and it is outputted as an S meter noise (S-N) signal.
[0011] An example of the S meter input signal inputted into the circuit as shown in drawing 2 , and an S meter noise component signal is shown in drawing 3 , an S meter noise level falls by the noise component, and carrying out the same actuation as an S meter is shown except the noise.
[0012] A microcomputer 8 receives the above-mentioned S meter signal and an S meter noise signal, and processing described below is performed. The flow chart about the procedure of average processing is shown in drawing 4 . First, if both the tuners of 2 judge that it is under reception (step S1) and are not receiving [be / it] the same frequency, processing will be ended, and if it is under reception, fixed timing measurement of the average of the S meter noise electrical potential difference of each tuner will be carried out (step S2). Next, the difference of the acquired average is calculated and it memorizes in memory as correction value (step S3). If this processing sets the average of the S meter noise electrical potential difference of tuners 100 and 200 to SN1 and SN2, respectively, correction value SN will be acquired by SN=SN1-SN2. This difference SN originates in the gain difference of an antenna.
[0013] Next, AF search processing which a microcomputer performs with reference to the flow chart shown in drawing 5 is explained. AF search looks for AF (alternative frequency) contained in the RDS data obtained in the RDS data demodulator circuit 7, and is a function which will move if the receive

state is better than a current frequency, and when it has two tuners, tuner 100 of one of the two makes it possible to carry out AF search with another tuner 200, receiving the frequency under current reception as it is. Now, in drawing 5 , it confirms whether to be beyond the fixed criteria that receive AF data and have an S meter (step S11). This of receiving sensibility is also bad if field strength is not large to some extent, and it is processing performed since the recovery of RDS data cannot be performed enough, either but the rate of AF search when there is many AF becomes very slow. If it is not beyond criteria, processing will be ended, and with criteria [beyond], the broadcast station code in RDS data (PI code) is checked, and it checks in how [broadcast or how (is it O.K.?)] of the same contents (step S12). Here, if it is not O.K., processing will be ended, if it is O.K. next, fixed timing measurement of the average of the S meter noise electrical potential difference of each tuner will be carried out, the S meter noise electrical potential difference of the tuner section 200 by the side of a search will be amended with the above-mentioned correction value SN, and the S meter noise electrical potential difference of each tuner sections 100 and 200 will be compared (step S13). If the searched S meter noise electrical potential difference of a station (frequency) is larger as a result of a comparison, it will move to the frequency (step S15), and if not large, processing is ended as it is. For example, when the average value of the tuner section is made into SN1' and SN2', respectively, the value of the amended tuner sections 100 and 200 is tuner section 100:SN correction value =SN1' tuner section 200:SN correction value =SN2'+SN (search side).

By such processing, the comparison of the receive state of each frequency is attained with the value which amended the gain difference of an antenna.

[0014] After moving to the good frequency of a receive state by AF search, the same frequency will be received, the S meter noise electrical potential difference of each tuner is compared as diver city actuation, and both tuners control a switch 9 and carry out the selection output of the audio signal of the larger one.

[0015] On circuitry, even if this detector does not exist, of course, the same processing is possible [in the above-mentioned example, although a receive state is judged, the S meter noise electrical potential difference is used, but] using an S meter signal. In this case, it can incorrect-judge at the time of generating of a multi-pass noise etc.

[0016]

[Effect of the Invention] As explained above, the 2 tuner diver city RDS receiver by this invention While two tuners receive the same frequency, carry out fixed timing measurement of the average of the S meter noise of each tuner, or an S meter signal level, and the gain difference of an antenna is amended. Since fixed timing measurement of the average of the S meter noise of each tuner or an S meter signal level is carried out and the value amended with the above-mentioned correction value is made into comparison criteria at the time of AF search processing, the comparison of the receive state of each frequency can be performed in the value which amended the gain difference of an antenna.

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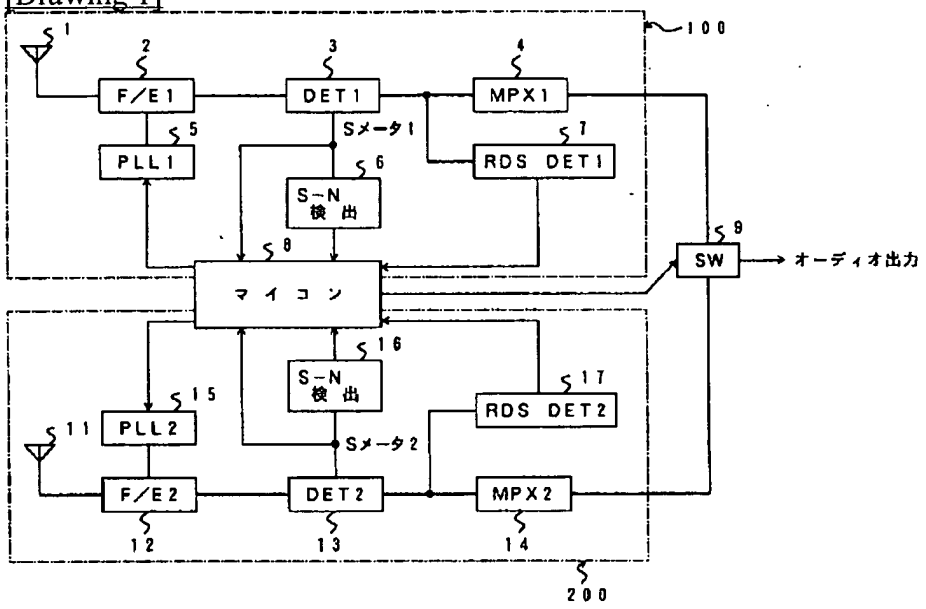
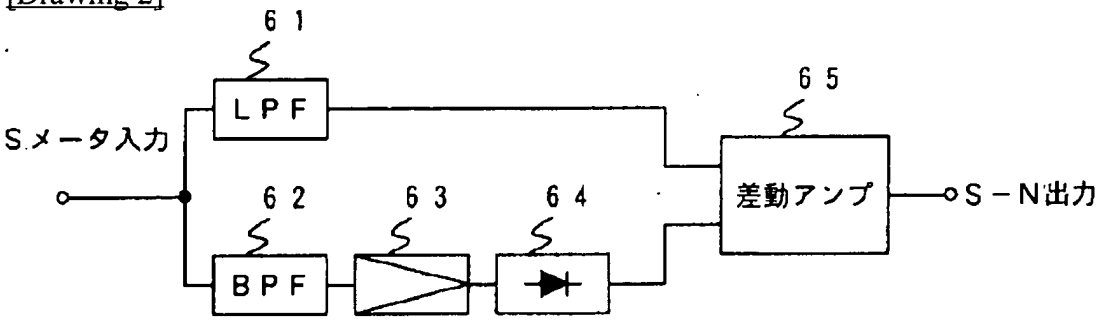
DRAWINGS

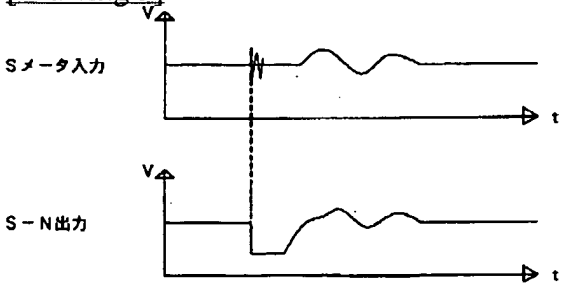
[Drawing 1]



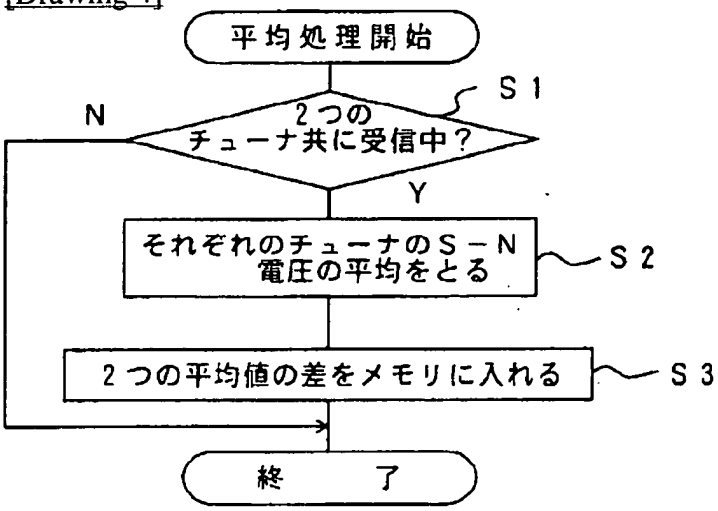
[Drawing 2]



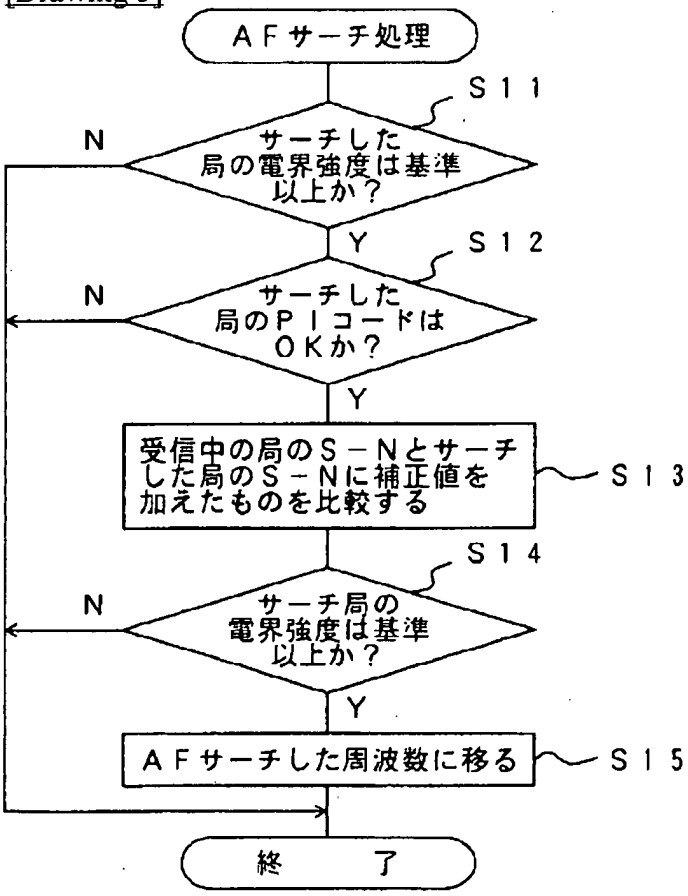
[Drawing 3]



[Drawing 4]



[Drawing 5]



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